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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,743	04/09/2004	Wei-Jye Lin	MR2707-61	8811
4586	7590	06/07/2005	EXAMINER	
ROSENBERG, KLEIN & LEE 3458 ELLICOTT CENTER DRIVE-SUITE 101 ELLICOTT CITY, MD 21043			KIM, SU C	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 06/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/820,743

Applicant(s)

LIN ET AL.

Examiner

Su C. Kim

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 April 2004.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.  
4a) Of the above claim(s) 13-15 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☐ Claim(s) \_\_\_\_\_ is/are rejected.  
7) ☒ Claim(s) 1 is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 09 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

***Remarks/Arguments***

By the response of restriction received on April 4, 2005, applicant elected Group II: Claims 1-12 are elected to process. Group I: Claims 13-15 are withdrawn from consideration.

**DETAILED ACTION**

***Drawings***

Figures 1A-1G should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Objections***

Claim 1 is objected to because of the following informalities:

Pertaining to claim 1, applicant discloses "a base region of a first conductivity type" and "a first shallow layer of said first conductivity type on base region". Applicant directs "a first conductivity layer" to the different types of conductivity layers.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

100

(S)

73

7

D3

8

72

n+

p+

6

9

10

p

71

5

n-

D1

D2

n+

1

2

3

4

5

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12

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I'

(D)

Takano discloses a method of [insert title of reference] as claimed. **See all the FIGS** where Takano teaches the following limitations

Claims 1, 2, 6-8, 10 & 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Takano et al.

1. Pertaining Claim 1, Takano discloses a contact process for a semiconductor device containing a base region of a first conductivity type **3** formed on a semiconductor substrate **1**, said contact process comprising the steps of:

heavily doping a first surface of said base region **3** for forming a first shallow layer **4** of said first conductivity type on said base region;

depositing an insulator **6** on said first shallow layer **4**;

etching said insulator **6** and first shallow layer **4** for forming a contact hole thereof to thereby expose a sidewall of said first shallow layer and a second surface of said base region;

thermally driving said first shallow layer **4** more deeply into said base region **3** ;

heavily doping said second surface of said base region through said contact hole for forming a second shallow layer of a second conductivity type (**P+ type**) opposite to said first conductivity type (**N+ type**) on said second surface of said base region; and

filling a metal **11 (See FIG 1A)** in said contact hole for contacting said sidewall of said first shallow layer and said second shallow layer **(See Fig 2, Please note Takano shows source contact layer (S) on the top of semiconductor layers, which is typically metal conductive layer).**

2. Pertaining to claim 2, Takano discloses the contact process of Claim 1, wherein said first shallow layer is formed by an ion implantation **(column 4 lines 52-53).**

3. Pertaining to claim 6, Takano discloses the contact process of Claim 1, wherein said first shallow layer is etched by a plasma etching **(column 4 lines 59-67, please note that reactive ion etching (RIE) is plasma etching).**

4. Pertaining to claim 7, Takano discloses the contact process of Claim 6, wherein said plasma etching comprises a vertical over-etching of a thickness of said base region **(Fig 5 & 6 Please note the etching process applies vertically).**

5. Pertaining to claim 8, Takano discloses the contact process of Claim 1, further comprising forming a pad oxide **6** on said sidewall of said first shallow layer **4** prior to said thermally driving said first shallow layer so as to prevent said first shallow layer from outdiffusion through said sidewall thereof during said thermally driving said first shallow layer **(column 4 lines 58-59).**

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6. Pertaining to claim 10, Takano discloses the contact process of Claim 1, further comprising an annealing after depositing said insulator (**column 5 lines 32-41**).

7. Pertaining to claim 12, Takano discloses the contact process of Claim 1, further comprising a blanket etching to said second shallow layer prior to said filling a metal in said contact hole (**Please see Fig 2. Source (S) and Drain (D) are connected on the top and bottom of semiconductor. To electrically connect Metal oxide semiconductor, the layers on the top and bottom of semiconductor must be metal conductive layer as shown FIG 2**).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 4 & 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takano (US 6717210) as applied to claims 1-2, 5-12 above, and further in view of Letavic (US 6551881 B1).



8. Pertaining to claim 3, Takano fails to disclose the contact process of Claim 2, wherein said ion implantation comprises an inclined ion implantation. Letavic teaches comprises an inclined ion implantation (Column 2 lines 47-56). In view of Letavic, it would have been obvious to one of ordinary skill in the art to incorporate the process step of Letavic into the Takano semiconductor process because of self-aligns the P-Channel body doping region and its respective body-drift region junction (Fig 2 column 2 lines 59-61).

9. Pertaining to claim 4, Takano discloses the contact process of Claim 3, wherein said inclined ion implantation is performed with an inclined angle of about 45 degrees.

10. Pertaining to claim 9, Takano discloses the contact process of Claim 8, wherein said pad oxide is formed by a low-temperature oxide growth.

Given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. See *In re Aller, Lacey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant

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must show that the chosen dimensions are critical. *In re Woodru* ; 919 f 2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)

Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. *Ex parte Ishizake*, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

Claims 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takano (US 6717210) and further view of Letavic (US 6551881 B1).

11. Pertaining to claim 5, Takano fails to disclose insulator is etched by a wet etching. Letavic teaches insulator is etched by a wet etching (Column 4, lines 25-28). In view of Letavic, it would have been obvious to one of ordinary skill in the art to incorporate the process step of Letavic into the Takano semiconductor process because of removal of the damaged silicon nitride layer and the thick oxide layer and exposing the self –aligned regions (column 4 lines 27-34).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takano (US 6717210) in view of Williams et al (USPUB 2005/0035398).

12. Pertaining to claim 11, Takano fails to disclose further comprising a annealing after forming said second shallow layer. Williams teaches further comprising a annealing after forming said second shallow layer (Column 14 lines 38-41). In view of Williams, it would have been obvious to one of ordinary skill in the art to incorporate the process step of Williams into the Takano semiconductor process because of rounding this glass is to prevent metal voids and step coverage issues (column 14 lines 49-50)

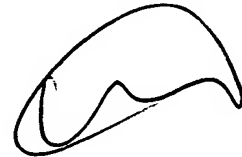
### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Su C. Kim whose telephone number is (571) 272-5972. The examiner can normally be reached on Monday - Friday, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaudhuri Olik can be reached on (571) 272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'W. David Coleman', with a stylized, flowing script.

**W. DAVID COLEMAN  
PRIMARY EXAMINER**